

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 5 | Technical Appendices

CFA25 | Castle Bromwich and Bromford

**Operational assessment (SV-004-025)**

Sound, noise and vibration

November 2013

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Department  
for Transport

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High Speed Two (HS2) Limited,  
Eland House,  
Bressenden Place,  
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

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## Appendix SV-004-025

Environmental topic:	Sound, noise and vibration	SV
Appendix name:	Operation assessment	004
Community forum area:	Castle Bromwich and Bromford	025

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# 1 Introduction

## 1.1 Structure of the sound, noise and vibration appendices

- 1.1.1 The sound, noise and vibration appendices comprise four sections. The first of these details the methodology used (Appendix SV-001-000) and relates to the sound, noise and vibration assessment for all community forum areas (CFA).
- 1.1.2 For the Castle Bromwich and Bromford community forum area (CFA25), the other three sections are as follows:
- baseline sound, noise and vibration (Appendix SV-002-025);
  - construction sound, noise and vibration (Appendix SV-003-025); and
  - operational sound, noise and vibration (Appendix SV-004-025) (this appendix).
- 1.1.3 The outcomes of this assessment are summarised in Volume 2: CFA25 Report, Chapter 11 Sound, Noise and Vibration.
- 1.1.4 Maps referred to throughout the sound, noise and vibration appendices are contained in the Volume 5 sound, noise and vibration map book.
- 1.1.5 This appendix presents the likely noise and vibration impacts, effects and significant effects arising from the operation of the Proposed Scheme for the Castle Bromwich and Bromford area on:
- people, primarily where they live ('residential receptors') in terms a) individual dwellings and b) on a wider community basis, including any shared community spaces; and
  - community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'.
- 1.1.6 The assessment of likely impacts, effects and significant effects from operational noise and vibration on agricultural, community, ecological or heritage receptors and the assessment of tranquillity are presented in the following documents within Volume 5:
- Agriculture, forestry and soils      Appendix AG-001-025
  - Community                                      Appendix CM-001-025
  - Ecology    Appendix EC-005-004
  - Heritage    Appendix CH-003-025
  - Landscape and Visual                      Appendix LV-001-025

## 1.2 Evaluation of impacts and effects

- 1.2.1 This appendix provides a quantitative assessment of operational noise and vibration impacts and effects and a qualitative assessment of likely significant effects, based on the impacts and effects identified and other local context information consistent with the scope and methodology defined for the Proposed Scheme.

- 1.2.2 Indirect effects arising from permanent changes in traffic patterns on the existing road and rail networks as a consequence of the Proposed Scheme are also reported in this appendix, where they would occur within the study area as defined in Volume 5 Appendix SV-001-000.
- 1.2.3 Route-wide impacts, effects and significant effects associated with noise or vibration from the operation of the Proposed Scheme are reported in Volume 3.
- 1.2.4 Off-route effects of noise or vibration arising from the operation of the Proposed Scheme, including those likely to arise from permanent changes in traffic patterns on roads or railways outside of the study area for direct effects are reported in Volume 4.
- 1.2.5 In undertaking the assessment of sound, noise and vibration, consistent with EIA Regulations and emerging National Planning Practice Guidance<sup>1</sup> a differentiation between impacts effects, adverse effects and significant effects is made. Further information is provided in Volume 5: Appendix SV001-000.
- 1.2.6 The assessment of impacts has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The Assessment Locations employed in this assessment are presented on map series Sv-02 in the CFA25 Volume 5 sound, noise and vibration map book.

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<sup>1</sup> National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk> ; refer to the table summarising noise exposure hierarchy

## 2 Scope, assumptions and limitations

### 2.1 Regional and local policy guidance

2.1.1 The policy framework for sound, noise and vibration is set out in Volume 1 and in Appendix SV-001-000. As part of the engagement with local authorities through the Planning Forum Sub Group (Acoustics), information regarding any specific local planning guidance in respect of noise and vibration has been requested. Whilst no information has been received for this study area via the Planning Forum Sub Group - Acoustics, the following local policy guidance on noise and vibration has been identified:

- The Birmingham Plan - Birmingham Unitary Development Plan - 2005

2.1.2 This guidance has been considered as part of formulating the detailed application of the impact and significance criteria set out in Volume 5, particularly Appendix SV-001-000.

### 2.2 Engagement

2.2.1 Details of engagement on a route-wide basis with the local and county authorities' Environmental Health Practitioners via the Planning Forum Sub Group (Acoustics), is set out in Volume 1, Section 8.

2.2.2 Engagement with communities has been via the Community Forums, as set out in Volume 1. In respect of sound, noise and vibration the following discussions have taken place:

- general discussions in respect of local issues, including possible ways to avoid and mitigate the potential impacts of noise or vibration
- September / October 2012; a specific presentation about sound, noise and vibration with discussion afterwards with one of the project team specialists;
- November / December 2012; specific request for the Community Forum to propose baseline sound monitoring locations;
- January / February 2013; feedback to the Community Forum on any proposed baseline monitoring locations; and
- verbal / written response to questions on sound, noise and vibration.

### 2.3 Methodology

2.3.1 The methodology used for the assessment of airborne sound, ground-borne sound and vibration impacts and the determination of significant effects is defined in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1), is clarified in a number of areas by the SMR addendum (Volume 5: Appendix CT-001-000/2). Further information is contained in Volume 5: Appendix SV-001-000.



## **2.4 Assumptions**

- 2.4.1 Route-wide assumptions are outlined in Volume 1, Section 8, and are further detailed in Volume 5: Appendix SV-001-000. Local assumptions that apply to the assessment of operational sound noise and vibration within this CFA are set out in Volume 2: Report 26.

## **2.5 Local limitations**

- 2.5.1 In this area, there are a number of locations where the land or property owners did not permit baseline sound level monitoring to be undertaken at their premises. However, sufficient information has been obtained to undertake the assessment. Further information is provided in Volume 5: Appendix SV-002-025.

## 3 Environmental baseline

### 3.1 Existing baseline

- 3.1.1 Baseline sound level data has been collected at locations representative of the airborne sound-sensitive receptors. The existing and future baseline airborne sound levels derived from these measurements are included within Table 3. Details of the baseline data collection and the methodology are given in Volume 5: Appendix SV-001-000 and specifically for this study area in Volume 5: Appendix SV-002-025.
- 3.1.2 The majority of receptors adjacent to the line of the route are not currently subject to appreciable vibration and therefore vibration at all receptors has been assessed using the absolute vibration criteria as described in Volume 5: Appendix SV-001-000.

### 3.2 Future baseline

- 3.2.1 The assessment is based upon the predicted change in sound levels that result from the Proposed Scheme. The assessment initially considered a reasonable worst case (that would overestimate the change in levels) by assuming that sound levels would not change from the existing baseline year of 2012/2013. Where significant effects were identified on this basis, the effects have been assessed using the baseline year of 2026 to coincide with the proposed start of passenger services. The future baseline is for the sound environment that would exist in 2026 without the Proposed Scheme.

## 4 Effects arising during operation

### 4.1 Introduction

4.1.1 The assessment is reported first for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts and effects are presented. This is followed by the identification of significant effects and the evidence used to support these conclusions.

4.1.2 The structure of this assessment report is:

- Avoidance and mitigation measures
- Quantitative identification of impact and effects
  - Ground-borne sound and vibration
    - Residential
    - Non-residential
  - Airborne sound
    - Residential
    - Non-residential
- Assessment of impacts and effects
  - Residential receptors: direct effects – dwellings
  - Residential receptors: direct effects – communities
  - Residential receptors: indirect effects
  - Non-residential receptors: direct effects
  - Non-residential receptors: indirect effects
  - Cumulative effects from the proposed scheme and other committed development.

### 4.2 Avoidance and mitigation measures

4.2.1 These are set out in Volume 2: Report 25.

### 4.3 Quantitative identification of impacts and effects

#### Ground-borne sound and vibration

4.3.1 Assessment locations defined for the quantitative assessment of impacts are shown on map series SV-02 in the CFA25 Volume 5 sound, noise and vibration map book.

4.3.2 For each Assessment Location, the assessment results for residential and non-residential receptors are presented in Table 1. Explanation of the information in Table 1 is provided in Appendix SV-001-000, with the following additional notes.






B	For non-residential receptors further detail about the type of effect is set out in the text of Volume 5: Appendix SV-001-000.
NA	Type of effect - Generally no adverse effect
A	Type of effect - Adverse effect
S	Type of effect - Significant adverse effect
VDV	Vibration Dose Value
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
^	The impact methodology has identified a potential significant effect at this receptor which based upon further qualitative information is not considered to be a likely significant effect. Please refer the end of this Appendix for further information.
	Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced residential community area, or individual receptor.
	Yellow denotes a low ground-borne noise impact or a minor ground-borne vibration impact
	Orange denotes a medium ground-borne noise impact or a moderate ground-borne vibration impact
	Red denotes a high ground-borne noise impact or a major ground-borne vibration impact
	Dark red denotes a very high ground-borne noise impact

Table 1: Ground-borne sound and vibration levels, noise and vibration impacts and effects

Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB $L_{pASmax}$	VDV $m/s^{1.75}$ Daytime (07:00 - 23:00)	VDV $m/s^{1.75}$ Night time (23:00 - 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
ID	Area represented													
95629	Orton Way, Birmingham	-	0.15	0.07	-	18	NA	R	T	-	-	-	-	-
622099	Reynoldstown Road, Birmingham	10	0.02	0.01	-	5	NA	R	T	-	-	-	-	-
622100	Sprig Croft, Birmingham	6	0.02	0.01	-	5	NA	R	T	-	-	-	-	-
622101	Bromford Drive, Birmingham	8	0.02	0.01	-	5	NA	R	T	-	-	-	-	-
622103	Bromford Drive, Birmingham	11	0.02	0.01	-	4	NA	R	T	-	-	-	-	-
622112	Cameronian Croft, Birmingham	22	0.05	0.02	-	1	NA	R	T	-	-	-	-	-
622114	Unnamed Road, Hodge Hill	14	0.03	0.02	-	2	NA	R	T	-	-	-	-	-
622116	Bromford Drive, Birmingham	11	0.03	0.01	-	115	NA	R	T	-	-	-	-	-
622123	Redcar Croft, Birmingham	8	0.02	0.01	-	10	NA	R	T	-	-	-	-	-
622124	Redcar Croft, Birmingham	8	0.02	0.01	-	8	NA	R	T	-	-	-	-	-
622125	Bromford Drive, Birmingham	13	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622126	Bromford Drive, Birmingham	12	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622127	Bromford Drive, Birmingham	13	0.03	0.01	-	2	NA	R	T	-	-	-	-	-
622128	Redcar Croft, Birmingham	9	0.02	0.01	-	5	NA	R	T	-	-	-	-	-
622129	Bromford Drive, Birmingham	15	0.03	0.01	-	2	NA	R	T	-	-	-	-	-
622130	Bromford Drive, Birmingham	12	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622136	Haydock Close, Birmingham	7	0.02	0.01	-	5	NA	R	T	-	-	-	-	-
622137	Haydock Close, Birmingham	12	0.03	0.01	-	5	NA	R	T	-	-	-	-	-

Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB $L_{pASmax}$	VDV $m/s^{1.75}$ Daytime (07:00 - 23:00)	VDV $m/s^{1.75}$ Night time (23:00 - 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
ID	Area represented													
622153	Bromford Drive, Birmingham	14	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622156	Bromford Drive, Birmingham	13	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622157	Bromford Drive, Birmingham	12	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622159	Haydock Close, Birmingham	9	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622160	Haydock Close, Birmingham	8	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622161	Haydock Close, Birmingham	9	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622163	Reynoldstown Road, Birmingham	8	0.02	0.01	-	3	NA	R	T	-	-	-	-	-
622167	Bromford Drive, Birmingham	10	0.03	0.01	-	8	NA	R	T	-	-	-	-	-
622168	Reynoldstown Road, Birmingham	9	0.02	0.01	-	2	NA	R	T	-	-	-	-	-
622169	Reynoldstown Road, Birmingham	8	0.02	0.01	-	4	NA	R	T	-	-	-	-	-
622174	Fishpool Close, Birmingham	8	0.02	0.01	-	4	NA	R	T	-	-	-	-	-
622175	Bromford Drive, Birmingham	9	0.02	0.01	-	6	NA	R	T	-	-	-	-	-
622209	Pinza Croft, Birmingham	10	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622210	Chillinghome Road, Birmingham	12	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622213	Sandown Road, Birmingham	11	0.03	0.01	-	2	NA	R	T	-	-	-	-	-
622214	Pinza Croft, Birmingham	11	0.03	0.01	-	2	NA	R	T	-	-	-	-	-
622215	Chillinghome Road, Birmingham	12	0.03	0.02	-	13	NA	R	T	-	-	-	-	-
622217	Chillinghome Road, Birmingham	12	0.03	0.01	-	2	NA	R	T	-	-	-	-	-
622220	Oxpiece Drive, Birmingham	10	0.03	0.01	-	4	NA	R	T	-	-	-	-	-

Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB $L_{pASmax}$	VDV $m/s^{1.75}$ Daytime (07:00 - 23:00)	VDV $m/s^{1.75}$ Night time (23:00 - 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
ID	Area represented													
622234	Chillinghome Road, Birmingham	11	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622235	Larkspur Croft, Birmingham	11	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622236	Chillinghome Road, Birmingham	11	0.03	0.01	-	5	NA	R	T	-	-	-	-	-
622237	Larkspur Croft, Birmingham	9	0.03	0.01	-	10	NA	R	T	-	-	-	-	-
622239	Larkspur Croft, Birmingham	11	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622240	Larkspur Croft, Birmingham	9	0.03	0.01	-	9	NA	R	T	-	-	-	-	-
622241	Chillinghome Road, Birmingham	11	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622243	Chillinghome Road, Birmingham	11	0.03	0.01	-	7	NA	R	T	-	-	-	-	-
622251	Chillinghome Road, Birmingham	9	0.03	0.01	-	3	NA	R	T	-	-	-	-	-
622259	Chillinghome Road, Birmingham	10	0.03	0.01	-	4	NA	R	T	-	-	-	-	-
622260	Wanderer Walk, Birmingham	10	0.03	0.01	-	10	NA	R	T	-	-	-	-	-
622263	Wanderer Walk, Birmingham	9	0.03	0.01	-	6	NA	R	T	-	-	-	-	-
95488	Haywards Industrial Park, Orton Way, Birmingham (General Commercial)	-	0.10	0.05	-	1	B	G4/V3	T	-	-	-	-	-
95629	Huntsman House, Tameside Drive, Birmingham (Shopping)	-	0.15	0.07	-	1	B	G4/V3	T	-	-	-	-	-
136721	Birmingham Road, Water Orton, (Stables)	-	0.18	0.08	-	1	B	G4/V3	T	-	-	-	-	-
622103	Bromford Drive, Birmingham (General Commercial)	11	0.02	0.01	-	1	B	G4/V3	T	-	-	-	-	-
622112	Bromford Bridge Residents Club,	22	0.05	0.02	-	1	B	G4/V3	T	-	-	-	-	-

Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB $L_{pASmax}$	VDV $m/s^{1.75}$ Daytime (07:00 - 23:00)	VDV $m/s^{1.75}$ Night time (23:00 - 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
ID	Area represented													
	Cameronian Croft (Club)													
622112	Firs & Bromford Sports & Community Centre, Cameronian Croft, (Community Centre)	22	0.05	0.02	-	2	B	G3/V3	T	-	-	-	-	-
622113	Cameronian Croft, Birmingham (Local Government Office)	20	0.05	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622114	Bromford Drive, Birmingham (Shopping)	14	0.03	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622114	Bromford Bridge Post Office, Bromford Drive (Post Office)	14	0.03	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622114	Bromford Drive, Birmingham, (General Commercial)	14	0.03	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622114	Bromford Drive, Birmingham, (General Commercial)	14	0.03	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622143	Fort Parkway, Erdington (Research)	8	0.02	0.01	-	1	B	G4/V2	T	-	-	-	-	-
622205	Tame Valley Community School, Chillinghome Road (School)	11	0.03	0.01	-	3	B	G4/V3	T	-	-	-	-	-
622288	Dunlop Way, Chester Road, Castle Vale (General Commercial)	19	0.04	0.02	-	1	B	G4/V3	T	-	-	-	-	-
622290	Holiday Inn Express, Chester Road, Castle Vale (Hotel)	16	0.04	0.02	-	2	B	G3/V2	T	-	-	-	-	-
622292	Castle Bromwich Business Park, Tameside Drive (General Commercial)	15	0.04	0.02	-	1	B	G4/V3	T	-	-	-	-	-



Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB $L_{pASmax}$	VDV $m/s^{1.75}$ Daytime (07:00 - 23:00)	VDV $m/s^{1.75}$ Night time (23:00 - 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
ID	Area represented													
622294	Tameside Drive, Castle Vale (Post Office)	24	0.05	0.03	-	1	B	G4/V3	T	-	-	-	-	-
622295	Castle Bromwich Business Park, Tameside Drive (General Commercial)	11	0.03	0.01	-	1	B	G4/V3	T	-	-	-	-	-
622296	Langley Drive, Birmingham (General Commercial)	-	0.26	0.12	-	1	B	G4/V3	T	-	-	-	-	-
622297	Langley Drive, Birmingham (General Commercial)	-	0.07	0.03	-	1	B	G4/V3	T	-	-	-	-	-
622301	Tameside Drive, Castle Vale (General Commercial)	-	0.04	0.02	-	3	B	G4/V3	T	-	-	-	-	-

## Impact summary





- 4.3.3 The operational ground-borne noise and vibration impacts identified in Table 1 are summarised in Table 2.

Table 2: Summary of operational ground-borne noise and vibration impacts

	Number of ground-borne noise impacts			
	Low	Medium	High	Very High
Residential properties	0	0	0	0
Non-residential properties	0			0
	Number of ground-borne vibration impacts			
	Minor	Moderate	Major	Risk of building damage
Residential properties	0	0	0	0
Non-residential properties	0			0

## Airborne sound: direct impacts and effects

- 4.3.4 The direct effects from the operation of the Proposed Scheme as well as any new, amended or altered roads or railway lines, which are identified as part of the scheme, are presented in Table 3.
- 4.3.5 The assessment information, impact criteria and significance criteria for the assessment of the incorporated mitigation case at residential and non-residential receptors are presented in Table 3. The results should be considered in conjunction with the information contained in map series Sv-02 in the CFA25 Volume 5 sound, noise and vibration map book.
- 4.3.6 Explanation of the Table 3 information is provided in Appendix SV001-000, with the following additional notes.

	Where the significant effect column is marked, then a significant effect is identified at the referenced group of dwellings, or individual residential or non-residential receptor.
	Yellow denotes a minor impact at a residential building – a change is of 3-5 dB
	Orange denotes a moderate impact at a residential building – a change is of 5-10 dB
	Red denotes a major impact at a residential building – a change is of >10 dB
*	Day - $L_{pAeq,07:00-23:00}$
**	Night - $L_{pAeq,23:00-07:00}$
***	Max - $L_{pAFmax}$ In the Proposed Scheme only column, two values are presented. The first is the value for the HS2 mitigated train and the second is the value for the TSI compliant train. For further information refer to Volume 5: Appendix SV-001-000.
****	Where the Proposed Scheme modifies an existing source, i.e. road or railway realignments, the <i>Proposed Scheme only</i> level in the table includes the sound from the modified source. In this situation the <i>Do something (Opening year baseline + Year 15 traffic)</i> level has been corrected so as to not double count the sound associated with the road or railway on its new and existing alignment.
A	Adverse effect
B	For non-residential receptors further detail about the type of effect is set out in the text of Appendix SV-001-000.

CD	Committed Development. The value in brackets in the number of impacts represented column is the value with the committed development.
G	(G1)Theatres, large auditoria and concert halls, (G2) Sound recording and broadcast studios, (G3) Places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (G4) Schools, colleges, hospitals, hotels and libraries, and (G5) Offices and general commercial premises
H	High existing ambient sound level. Defined as $>65\text{dB}_{\text{Aeq, day}}$ and/or $>55\text{dB}_{\text{Aeq, night}}$
L	Low existing ambient sound level. Defined as $<42\text{dB}_{\text{Aeq, day}}$ and/or $<32\text{dB}_{\text{Aeq, night}}$
LD	Landscape receptor
NA	Generally no adverse effect
NI	The receptor is predicted to qualify for mitigation, which shall be provided to the specification defined in the Noise Insulation (Railways and other Guided Rail Systems) Regulations 1996
R	Residential
RM	Residential mooring
S	Significant adverse effect
U	Unacceptable adverse effect
#	A change of 3dB or greater has been identified however, the assessment methodology only defines an impact where the absolute sound level from the Proposed Scheme is greater or equal to 50 dB $L_{\text{pAeq, 23:00} - 07:00}$ during the daytime or 40 dB $L_{\text{pAeq, 07:00} - 23:00}$ at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000)..
\$	A change of 3dB or greater has been identified however, the impact methodology for non-residential receptors includes a screening criteria for G3 building use of 50 dB $L_{\text{pAeq, 07:00} - 23:00}$ , for G4 building use 55 dB $L_{\text{pAeq, 07:00} - 23:00}$ and 45 dB $L_{\text{pAeq, 23:00} - 07:00}$ , for G5 building use 55 dB $L_{\text{pAeq, 07:00} - 23:00}$ . At the receptor denoted the screening criteria is not met and therefore no impact is identified. Further information is provided in Volume 5: Appendix SV-001-000.
^	The impact methodology has either identified an impact at a receptor which based upon further qualitative information does not gives rise to a significant effect. Further information is provided at the end of this Appendix.

Table 3: Operational airborne sound level, noise impacts and effects

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
73663	Bromford Drive, Birmingham	23	17	45/47	65	59	70	65	59	0	0	NA	23	R	T	H	-	-	-	
74835	Farnhurst Road, Birmingham	27	21	44/45	65	57	69	65	57	0	0	NA	19	R	T	H	-	-	-	
75260	Bromford Road, Birmingham	28	22	47/48	60	54	64	60	54	0	0	NA	12	R	T	-	-	-	-	
75421	Farnhurst Road, Birmingham	24	18	43/45	65	55	69	65	55	0	0	NA	26	R	T	H	-	-	-	
84527	Bromford Lane, Erdington	34	29	46/48	72	68	74	72	68	0	0	NA	2	R	T	H	-	-	-	
85195	Concorde Drive, Castle Vale, Birmingham	30	20	51/52	61	58	65	61	58	0	0	NA	70	R	T	H	-	-	-	
85666	Trident Boulevard, Castle Vale, Birmingham	48	38	68/70	54	52	56	55	52	1	0	NA	55	R	T	-	-	-	-	
85833	Javelin Avenue, Birmingham	55	45	74/75	58	58	62	60	58	2	0	A	29	R	T	H	-	-	-	
85858	Javelin Avenue, Birmingham	53	43	71/73	60	57	62	61	57	1	0	A	53	R	T	H	-	-	-	
86180	Javelin Avenue, Birmingham	47	37	66/68	60	51	56	60	51	0	0	NA	59	R	T	-	-	-	-	
86972	Avery Croft, Birmingham	33	23	55/56	60	54	59	60	54	0	0	NA	31	R	T	-	-	-	-	
91251	Hawker Drive, Birmingham	30	21	51/53	56	56	62	56	56	0	0	NA	40	R	T	H	-	-	-	
91392	Avery Croft, Birmingham	30	20	52/53	62	58	62	62	58	0	0	NA	48	R	T	H	-	-	-	
92306	Cadbury Drive, Birmingham	32	22	55/57	62	59	66	62	59	0	0	NA	23	R	T	H	-	-	-	
93223	Blenheim Way, Castle Vale, Birmingham	48	38	67/69	56	53	61	56	53	1	0	NA	45	R	T	-	-	-	-	
93389	Blenheim Way, Castle Vale, Birmingham	52	42	71/73	63	60	66	63	60	0	0	A	19	R	T	H	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
93426	Lancaster Drive, Birmingham	54	44	74/75	59	56	65	60	56	1	0	A	32	R	T	H	-	-	-	
93431	Wellington Way, Birmingham	43	33	62/64	56	53	61	56	53	0	0	NA	60	R	T	-	-	-	-	
93473	Spitfire Way, Castle Vale, Birmingham	46	36	65/67	63	60	66	63	60	0	0	NA	22	R	T	H	-	-	-	
93498	Spitfire Way, Castle Vale, Birmingham	49	40	70/72	63	60	66	63	60	0	0	A	4	R	T	H	-	-	-	
93521	Blenheim Way, Castle Vale, Birmingham	57	47	76/78	59	55	63	61	56	2	1	A	16	R	T	H	-	-	-	
93841	Farnborough Road, Birmingham	38	28	56/58	62	59	67	63	59	0	0	NA	103	R	T	H	-	-	-	
93954	Drem Croft, Birmingham	36	26	56/58	62	59	67	63	59	0	0	NA	69	R	T	H	-	-	-	
93975	Cadbury Drive, Birmingham	36	26	58/59	61	57	64	61	57	0	0	NA	8	R	T	H	-	-	-	
94017	Kenrick Croft, Birmingham	33	23	54/56	60	54	59	60	54	0	0	NA	40	R	T	-	-	-	-	
94167	Clayton Walk, Birmingham	37	27	59/60	61	57	64	61	57	0	0	NA	9	R	T	H	-	-	-	
94183	Beale Close, Birmingham	37	27	58/59	65	53	58	65	53	0	0	NA	43	R	T	H	-	-	-	
94195	Beale Close, Birmingham	36	26	56/58	65	53	58	65	53	0	0	NA	22	R	T	H	-	-	-	
94261	Cadbury Drive, Birmingham	39	29	61/62	61	57	64	61	57	0	0	NA	5	R	T	H	-	-	-	
94303	Jackson Walk, Birmingham	34	24	54/56	56	53	58	56	53	0	0	NA	51	R	T	-	-	-	-	
94450	Howes Croft, Birmingham	40	30	60/62	59	53	65	59	53	0	0	NA	21	R	T	-	-	-	-	
94486	Jackson Walk, Birmingham	40	30	59/62	61	57	64	61	57	0	0	NA	10	R	T	H	-	-	-	
94499	Howes Croft, Birmingham	39	29	59/60	56	53	58	56	53	0	0	NA	27	R	T	-	-	-	-	
94507	Howes Croft, Birmingham	39	29	58/60	61	57	64	61	57	0	0	NA	26	R	T	H	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
94528	Cadbury Drive, Birmingham	41	31	61/64	62	58	69	62	58	0	0	NA	13	R	T	H	-	-	-	
94813	Cadbury Drive, Birmingham	43	33	63/64	59	53	65	59	53	0	0	NA	44	R	T	-	-	-	-	
94822	Spitfire Way, Castle Vale, Birmingham	46	37	67/69	63	60	66	63	60	0	0	NA	10	R	T	H	-	-	-	
95386	Kingsleigh Drive, Birmingham	39	29	59/61	58	54	58	58	54	0	0	NA	23	R	T	-	-	-	-	
95601	Kingsleigh Drive, Birmingham	36	26	58/59	57	52	54	57	52	0	0	NA	37	R	T	-	-	-	-	
95800	Farnborough Road, Birmingham	39	29	57/58	60	55	64	60	55	0	0	NA	81	R	T	H	-	-	-	
96062	Farnborough Road, Birmingham	44	34	64/65	59	56	66	59	56	0	0	NA	60	R	T	H	-	-	-	
97695	Hurricane Way, Birmingham	33	23	53/55	61	58	65	61	58	0	0	NA	78	R	T	H	-	-	-	
131548	Farnborough Road, Birmingham	44	34	62/64	57	54	65	57	55	0	0	NA	1	R	T	-	-	-	-	
132963	Park View, Castle Bromwich, Birmingham	42	35	52/54	61	54	63	61	54	0	0	NA	10	R	T	-	-	-	-	
133047	Bentley Court, Castle Bromwich, Birmingham	37	30	51/53	61	54	63	61	54	0	0	NA	16	R	T	-	-	-	-	
133103	Blewitt Close, Birmingham	46	36	62/63	61	58	65	61	58	0	0	NA	25	R	T	H	-	-	-	
133144	Pikehorne Croft, Birmingham	45	35	61/63	61	58	65	61	58	0	0	NA	31	R	T	H	-	-	-	
133224	Chadshunt Close, Birmingham	47	38	63/65	62	49	60	63	50	0	0	NA	31	R	T	-	-	-	-	
133321	Castello Drive, Birmingham	46	36	61/63	61	58	65	61	58	0	0	NA	12	R	T	H	-	-	-	
133335	Blewitt Close, Birmingham	46	37	62/63	61	58	65	61	58	0	0	NA	11	R	T	H	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
133399	Tackford Close, Birmingham	42	32	57/59	53	50	54	53	50	0	0	NA	36	R	T	-	-	-	-	
133485	Aspbury Croft, Birmingham	45	35	60/62	61	58	65	61	58	0	0	NA	25	R	T	H	-	-	-	
133823	Castello Drive, Birmingham	43	33	59/61	53	50	54	54	50	0	0	NA	17	R	T	-	-	-	-	
133912	Parkfield Drive, Birmingham	42	32	58/59	62	47	60	62	47	0	0	NA	33	R	T	-	-	-	-	
134409	Parkfield Drive, Birmingham	41	31	58/60	62	47	60	62	47	0	0	NA	38	R	T	-	-	-	-	
134691	Faircroft Road, Birmingham	39	29	56/57	62	47	60	62	47	0	0	NA	11	R	T	-	-	-	-	
135106	Watchbury Close, Birmingham	44	34	61/62	58	60	62	58	60	0	0	NA	7	R	T	H	-	-	-	
135208	Watchbury Close, Birmingham	44	35	61/62	58	60	62	58	60	0	0	NA	15	R	T	H	-	-	-	
135257	Musborough Close, Birmingham	40	30	58/59	53	50	54	53	50	0	0	NA	28	R	T	-	-	-	-	
135276	Musborough Close, Birmingham	45	35	62/64	58	60	62	58	60	0	0	NA	14	R	T	H	-	-	-	
135509	Flecknoe Close, Birmingham	42	32	59/61	58	60	62	58	60	0	0	NA	13	R	T	H	-	-	-	
135599	Crawshaws Road, Birmingham	44	34	62/63	58	60	62	58	60	0	0	NA	20	R	T	H	-	-	-	
136729	Milesbush Avenue, Birmingham	44	34	61/62	52	49	60	53	49	0	0	NA	24	R	T	-	-	-	-	
139350	Water Orton Road, Birmingham	42	34	54/55	51	47	56	52	47	0	0	NA	3	R	T	-	-	-	-	
139360	Milesbush Avenue, Birmingham	39	29	56/58	51	47	56	52	47	0	0	NA	18	R	T	-	-	-	-	
700521	Tameside Drive, Birmingham	47	37	69/71	70	63	71	70	63	0	0	NA	10	R	T	H	-	-	-	
700523	Kingsleigh Drive, Birmingham	37	27	55/57	58	54	58	58	54	0	0	NA	12	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
700525	Danzeley Greet Road, Birmingham	42	32	62/63	58	60	62	58	60	0	0	NA	12	R	T	H	-	-	-	
66479	Hurricane Park, Heartlands Parkway, Birmingham, (Office)	38	32	50/51	71	65	74	71	65	0	0	B	3	G5	T	H	-	-	-	
67066	Bromford Lane Care Centre, Fairholme Road (Day Care)	26	21	45/46	65	57	69	65	57	0	0	B	1	G4	T	H	-	-	-	
71180	Gravelly Industrial Park, Birmingham (General Commercial)	37	32	53/54	81	73	74	81	73	0	0	B	20	G5	T	H	-	-	-	
71180	Gravelly Industrial Park, Birmingham (Office)	37	32	53/54	81	73	74	81	73	0	0	B	4	G5	T	H	-	-	-	
73663	Bromford Medical Centre, Warstone Tower, Bromford Drive (Health Centre)	23	17	45/47	65	59	70	65	59	0	0	B	1	G4	T	H	-	-	-	
74835	Bromford Lane, Washwood Heath, (General Commercial)	27	21	44/45	65	57	69	65	57	0	0	B	2	G5	T	H	-	-	-	
74835	Drews Lane Post Office, Bromford Lane (Post Office)	27	21	44/45	65	57	69	65	57	0	0	B	1	G5	T	H	-	-	-	
84527	Bromford Gate, Bromford Lane, Erdington (General Commercial)	34	29	46/48	72	68	74	72	68	0	0	B	5	G5	T	H	-	-	-	
84527	Bromford Lane, Erdington, (General Commercial)	34	29	46/48	72	68	74	72	68	0	0	B	2	G5	T	H	-	-	-	
84527	Bromford Mills, Bromford Lane, Erdington, (Factory)	34	29	46/48	72	68	74	72	68	0	0	B	1	G5	T	H	-	-	-	



Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
84527	Bromford Lane, Erdington, (Office)	34	29	46/48	72	68	74	72	68	0	0	B	1	G5	T	H	-	-	-	
86972	Brooks Croft, Birmingham, (General Commercial)	33	23	55/56	60	54	59	60	54	0	0	B	1	G5	T	-	-	-	-	
92477	Castle Bromwich Business Park, Tameside Drive (General Commercial)	27	17	58/59	69	64	74	69	64	0	0	B	1	G5	T	H	-	-	-	
92477	Post Office, Tameside Drive, Castle Vale, (Post Office)	27	17	58/59	69	64	74	69	64	0	0	B	1	G5	T	H	-	-	-	
93954	Chivenor Junior & Infant School, Farnborough Road, (Infant School)	36	26	56/58	62	59	67	63	59	0	0	B	2	G4	T	-	-	-	-	
93954	Chivenor House, Drem Croft, Birmingham, (General Commercial)	36	26	56/58	62	59	67	63	59	0	0	B	1	G5	T	-	-	-	-	
94450	Howes Croft, Birmingham, (General Commercial)	40	30	60/62	59	53	65	59	53	0	0	B	1	G5	T	-	-	-	-	
94813	Castle Vale Swimming Pool, Farnborough Road, (Swimming Pool)	43	33	63/64	59	53	65	59	53	0	0	B	1	G5	T	-	-	-	-	
95488	Tameside Drive, Castle Vale, (General Commercial)	46	36	63/65	70	63	71	70	63	0	0	B	3	G5	T	H	-	-	-	
95488	Haywards Industrial Park, Orton Way, Birmingham, (General Commercial)	46	36	63/65	70	63	71	70	63	0	0	B	1	G5	T	H	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
95567	Langley Drive, Birmingham, (Office)	36	26	66/67	70	63	71	70	63	0	0	B	2	G5	T	H	-	-	-	
95567	Langley Drive, Birmingham, (General Commercial)	36	26	66/67	70	63	71	70	63	0	0	B	5	G5	T	H	-	-	-	
95567	Castle Bromwich Delivery Office, Tameside Drive, (Post Office)	36	26	66/67	70	63	71	70	63	0	0	B	1	G5	T	H	-	-	-	
95567	Castle Bromwich Business Park, Tameside Drive (General Commercial)	36	26	66/67	70	63	71	70	63	0	0	B	1	G5	T	H	-	-	-	
95800	Farnborough Road, Birmingham (Shopping)	39	29	57/58	60	55	64	60	55	0	0	B	1	G5	T	-	-	-	-	
132532	Park Hall Academy, Water Orton Road (School)	49	42	59/60	63	58	65	62	58	0	0	B	1	G4	T	-	-	-	-	
132672	Lanchester School, Lanchester Way, Birmingham, (School)	41	34	50/52	61	54	63	61	54	0	0	B	1	G4	T	-	-	-	-	
136721	Twisted Oak Stables, Birmingham Road, Water Orton, (Stables)	56	47	72/73	68	57	77	68	57	0	0	B	1	G5	T	H	-	-	-	

### *Direct impact - Summary*

4.3.7 The operational airborne noise impacts identified in Table 3 are summarised in Table 4.

Table 4: Summary of operational airborne sound impacts

Receptor	Number of impacts		
	Minor	Moderate	Major
Residential properties	0	0	0
Non-residential properties	0	0	0
Quiet areas	None	None	None

## 4.4 Assessment of impacts and effects

### Residential receptors: direct effects - individual buildings

4.4.1 The mitigation measures will reduce noise inside all dwellings such that it will not reach a level where it would significantly affect residents.

### Residential receptors: direct effects –communities

4.4.2 The mitigation measures in this area will avoid airborne noise adverse effects on the majority of receptors, and at the following communities:

- Castle Vale;
- Bromwich; and
- Castle Bromford.

4.4.3 Taking account of the envisaged mitigation, Map Series SV-05 (Volume 2 Map book) shows the long term 40dB<sup>2</sup> night-time sound level contour from the operation of trains on the Proposed Scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour<sup>3</sup>. In general, below these levels adverse effects are not expected.

4.4.4 Above 40dB during the night and 50dB during the day the effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Map Series SV-05 (Volume 2 Map Book).

<sup>2</sup> Defined as the equivalent continuous sound level from 23:00 to 07:00 or  $L_{pAeq,night}$

<sup>3</sup> With the train flows described in the assumptions section of this CFA Report, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or  $L_{pAeq,day}$ ) from the Proposed Scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the Proposed Scheme at which the daytime sound level would be 50dB.

- 4.4.5 The changes in noise levels are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life and are considered to be significant when assessed on a community basis<sup>4</sup> taking account of the local context. However, when assessed on this basis, there are no adverse effects in this area that are considered to be significant.

### **Residential receptors: indirect effects**

- 4.4.6 The transport assessment presented in Volume 5: Appendix TR-001-000, has been used to identify those roads or railways within this study area where the alignment remains as at present, but a change in flow or composition is identified which is greater than the screening criteria defined in Volume 5: Appendix SV-001-000. No roads or railways which exceed the criteria defined in Volume 5: Appendix SV-001-000 have been identified in this study area.
- 4.4.7 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

### **Non-residential receptors: direct effects**

- 4.4.8 The assessment of operational noise and vibration indicates that significant direct effects on non-residential receptors are unlikely to occur in this area.

### **Non-residential receptors: indirect effects**

- 4.4.9 No roads or railways which exceed the screening criteria defined in Appendix SV-001-000 have been identified in this study area.
- 4.4.10 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

### **Cumulative effects**

- 4.4.11 Details of properties being currently developed which were afforded planning approval before the safeguarding date are presented in Volume 5: Appendix CToo4-000. Within this area, the operational sound, noise or vibration associated with these developments in conjunction with the operation of the Proposed Scheme do not result in any significant cumulative effects.

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<sup>4</sup> Further information is contained in Volume 1.